

Seven Reasons:

Why Digital TV Reception Drops-Out



A free report detailing steps
to improve digital TV reception.

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Hi, thanks for taking the time to look at my e-report.

As a qualified electronic tradesman, TV technician, registered cabler and professional TV antenna installer, I have over 16 years of experience installing and repairing antenna systems.

I prepared the report to help clients understand what it is that I am doing for them when I dis-appear into the ceiling crawl-space or climb a ladder onto their rooftop, and why I am doing it. This list contains the most common problems that I encounter with obsolete analogue antenna systems and how I deal with them.

Before we get to the antenna system faults, it may help to explain in non-technical terms some of the features of digital television, and how they differ from the now obsolete analogue television broadcast system.

The analogue TV system as the name suggests would mix an analogue picture with a radio frequency carrier to create a RF video signal. Sound would be added as an FM radio signal along-side the video signal. This would then be broadcast from the network's transmitter.

At the receiving end (your TV antenna) the important aspects of this signal were signal power, and the signal to noise ratio (SNR). If the signal power was sufficiently high and the noise was sufficiently low. You had a clear picture. If signal power dropped, the picture would get progressively more 'snowy' as the noise proportion of the signal increased. There was a direct correlation between signal power and picture clarity.

In the digital system, the picture and sound is converted to a digital signal (ones and zeros) before being mixed with a radio frequency carrier to create a digital TV broadcast signal. At the receiving end this process is reversed.

The two instantly noticeable benefits of the digital system are significantly better picture quality and the elimination of snowy & ghosting pictures. Among many other advantages is that it can resolve a perfectly clear picture with a weaker signal than the analogue system. This is in part, due to the error correction that the digital system employs to overcome the data corruption caused by signal noise.

While the TV receiver's error correction system is working within designed parameters, the viewer will see the same perfect TV picture quality regardless of the signal strength. Unlike the analogue system, picture clarity cannot be used as a guide to signal strength and quality.

If the digital signal becomes degraded for whatever reason beyond the ability of the (TV or set-top-box) receiver's error correction to recover lost data, the viewer will experience a drop-out. This could be in the form of pixelated 'blocks' appearing in the picture; frozen pictures and clicks or buzzing from the speakers. In extended drop-outs there may be no picture or sound at all.

If drop-outs are experienced on a regular basis, this is usually an indication that the TV antenna system is performing poorly. It may not have sufficient margin of signal above the drop-out threshold; or may be affected by impulse noise generated by other electrical devices. This can be due to old age, poor design, poor installation or a fault.

For ultimate digital TV reliability, I would recommend complete replacement of all obsolete analogue antenna systems components. As cost usually is a factor, these repairs or upgrades can be performed one step at a time until TV reception becomes satisfactory.



Before attempting any repairs yourself, read this report entirely. Please pay particular attention to the safety notices on the final page.

The seven most common reasons that digital reception may drop-out are:

- 1. Poor quality or damaged TV flyleads.**
- 2. Loose, damaged or inappropriate wall outlets.**
- 3. Inappropriate signal splitters used in antenna distribution cabling.**
- 4. Inappropriate or damaged cable.**
- 5. Signal amplifiers (boosters).**
- 6. Inappropriate antenna type or size.**
- 7. Poorly selected antenna mounting location.**

1. Poor Quality or Damaged Flyleads.

TV flyleads are the cables which connect the TV to the antenna socket on the wall. Most mass produced flyleads with moulded plastic end plugs are made from poor quality cable. These flyleads have insufficient shielding to screen out unwanted signal noise, and very thin internal copper conductors which are prone to breaking.



For optimum signal transfer, all coaxial cable in a digital TV antenna system should meet the RG6Q specification. Any cable that does will have RG6Q printed on it at 1 meter intervals.

Flyleads made by professional antenna installers should be made from RG6Q cable with crimped metal end plugs.



 Be wary of buying TV cables on the internet. They are usually built to meet a price, not a standard. Quality components will out-perform and outlast inferior ones. Only purchase flyleads that are constructed from RG6Q cable.

A simple test to determine if a flylead or socket is faulty is to hold the cable in your hand while watching a free-to-air channel on your TV. If moving the flylead with your hand causes any disturbances in the picture then there is a problem with either the flylead or the socket. If this is the case then I would recommend having both lead and socket replaced.

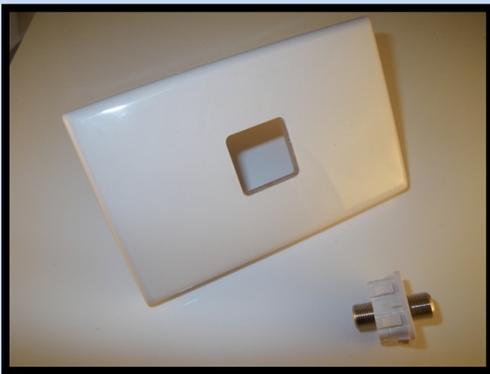
2. Loose, damaged or inappropriate wall outlets.

Obsolete analogue outlets use a saddle clamp and screw to connect the antenna cable on the back of the wall plate. There are a few problems with this design:

a. Mechanical stress on the socket caused by the TV flylead can cause damage and therefore a poor or intermittent connection in the system.



b. In order to connect the coaxial antenna cable to the back of the socket, it is necessary to strip back the cable shielding to expose the centre conductor. This creates a break in the cable shielding, and can also affect the impedance* of the cable. This is another point where unwanted signal noise can degrade your TV reception.

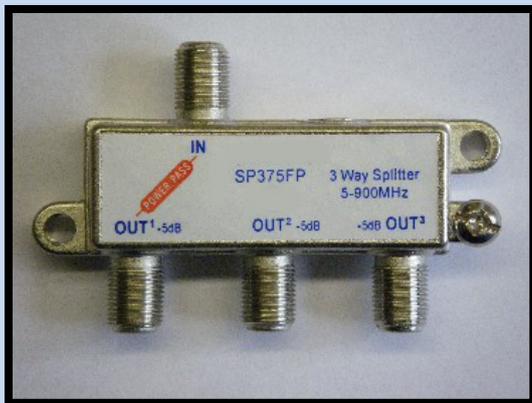
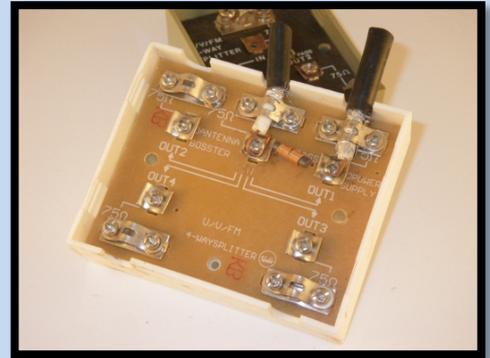
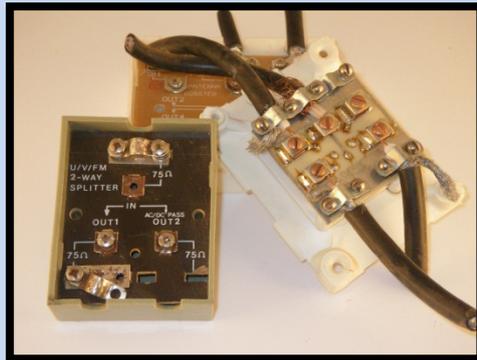


The best type of wall socket to use for digital TV antenna systems is the 'F' terminal. These are the screw-on plugs used by the pay-tv industry. The wall outlet has a screw socket on both front and back. This allows for virtually damage proof connections that easily screw together, and does not compromise the cable shielding at all.

* Impedance is a designed characteristic of coaxial cable. It is important that impedance is not altered by cable damage, faulty cable connections or inappropriate components. This can lead to loss of signal power and reflected signals being created in the antenna system which reduces signal quality

3. Inappropriate signal splitters.

Obsolete analogue signal splitters will usually have saddle clamp and screw connectors also. These are not appropriate for digital because they compromise the shielding of all the cables connected.



All digital TV signal splitters should be encapsulated in a metal and have F terminals for cable connection. Splitters are available in several configurations, i.e.: 2-way, 3-way, 4-way, 6-way, 8-way, etc.

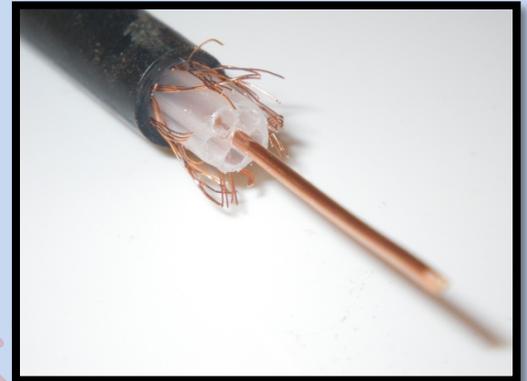


A splitter should be no larger than required unless there is extra headroom designed into the system. The more outlets there are on a splitter, the weaker your signal will become.

4. Inappropriate or damaged cable.

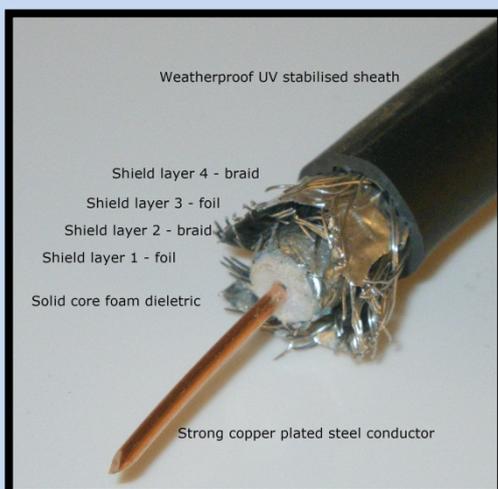
Cable length, specification and age can all affect signal strength and signal quality. Many older obsolete analogue cables have inadequate shielding for optimum digital TV signal transfer. This can cause a loss in signal quality. They can also have significantly greater signal power loss per meter of cable compared to the RG6Q specification

 Some older cables also have an air-space dielectric (insulator) between the inner and outer conductor. If this style of cable is used and the connection at the antenna is not correctly water proofed, water can enter the cable. I have seen numerous cases of corroded splitters caused by water ingress and a few extreme cases where there water made it all the way into the TV or VCR.



 Not all coaxial cables are the same. All TV cable should have 75Ω impedance. It is not appropriate to use coaxial cable designed for communications radio antenna (UHF or mobile phone) as these have 50Ω impedance. The impedance rating of a cable will be printed on the cable at 1 meter intervals.

 Coaxial cable should not be crushed, kinked or bent through a radius less than 12 times its diameter. Damage to the cable will affect the impedance. This causes reflected signals inside the cable and significantly reduces the signal strength and quality.



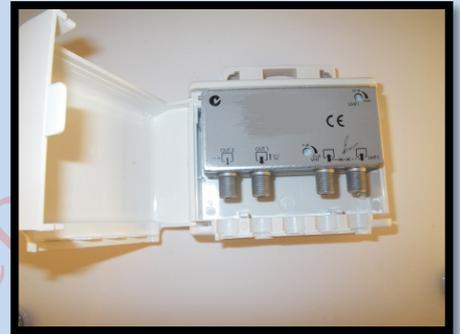
If dropouts are still occurring after replacing fly leads, outlets and splitters, re-cabling is the next step to take. The down-lead from the antenna to the splitter should be replaced first. Next replace splitter to outlet cables individually if needed. All new cable should meet the low-loss RG6Q specification

5. Signal amplifiers.

In my experience signal amplifiers are the most miss-used piece of antenna hardware. Many people are given advice from a 'knowledgeable' friend or hardware store attendant to 'just put a booster on it'. They are then usually sold an indoor (behind the TV) distribution amplifier. This is not appropriate for a low signal condition. It may improve the picture, but would not give the same reliability of correctly repairing the problem.

You do not want to use an antenna amplifier if it is not necessary. Unfortunately amplifiers can't discriminate between actual TV signals and 'in-band' radio noise. Everything in the TV spectrum gets amplified.

Before installing an amplifier, you should first ensure that the antenna is appropriate for the location, and is situated in the best place for optimum signal



If signal is still low then a masthead amplifier can be used. This amplifier is housed in a weatherproof box and is attached to the mast just below the antenna. The reason for this is that in order to maintain signal quality, it is desirable to have minimal unwanted noise being amplified along with the TV signal.

Masthead amplifiers are remotely powered through the antenna cable from your TV outlet. If the power is disconnected, very little signal will get through the amplifier and there will be loss of reception.



Often when moving into a home that has an antenna amplifier installed, there is no TV reception because the previous resident may have taken the amplifier's power supply with them. In this case you will need to contact your local antenna installer to get a replacement unit. The brand and model of amplifier will need to be identified in order to select a power supply with the appropriate voltage.

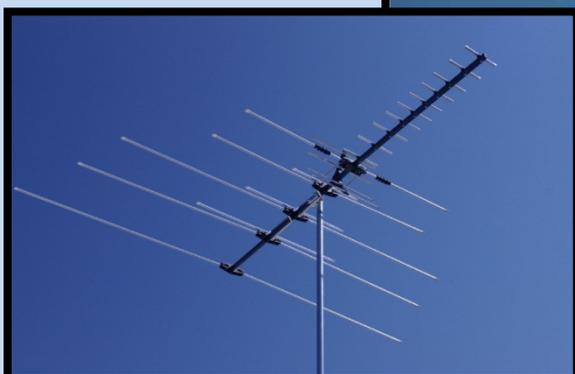
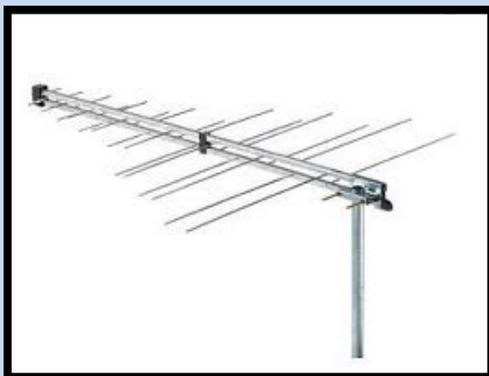
6. Inappropriate antenna.

A TV antenna should be appropriate for the channels to be received, the distance from the transmitter, and the number of outlets you wish to connect to it. Set-top indoor antenna will not provide reliable reception.

 Don't buy an antenna just because it is what they stock at the local hardware store. They probably have the same range of antenna in all their stores across the country. It will work, but may not be suited specifically for the channels that are available in your area. If you have an inappropriate antenna, you will have a weak signal on some or all of your channels, and the antenna may be larger than necessary. When purchasing a new antenna, talk to your local professional antenna installer and buy from them. That way you should get the right antenna for your needs.

If your old analogue antenna is still in good condition and is appropriate for the available channels, there should be no need to replace it for digital TV reception.

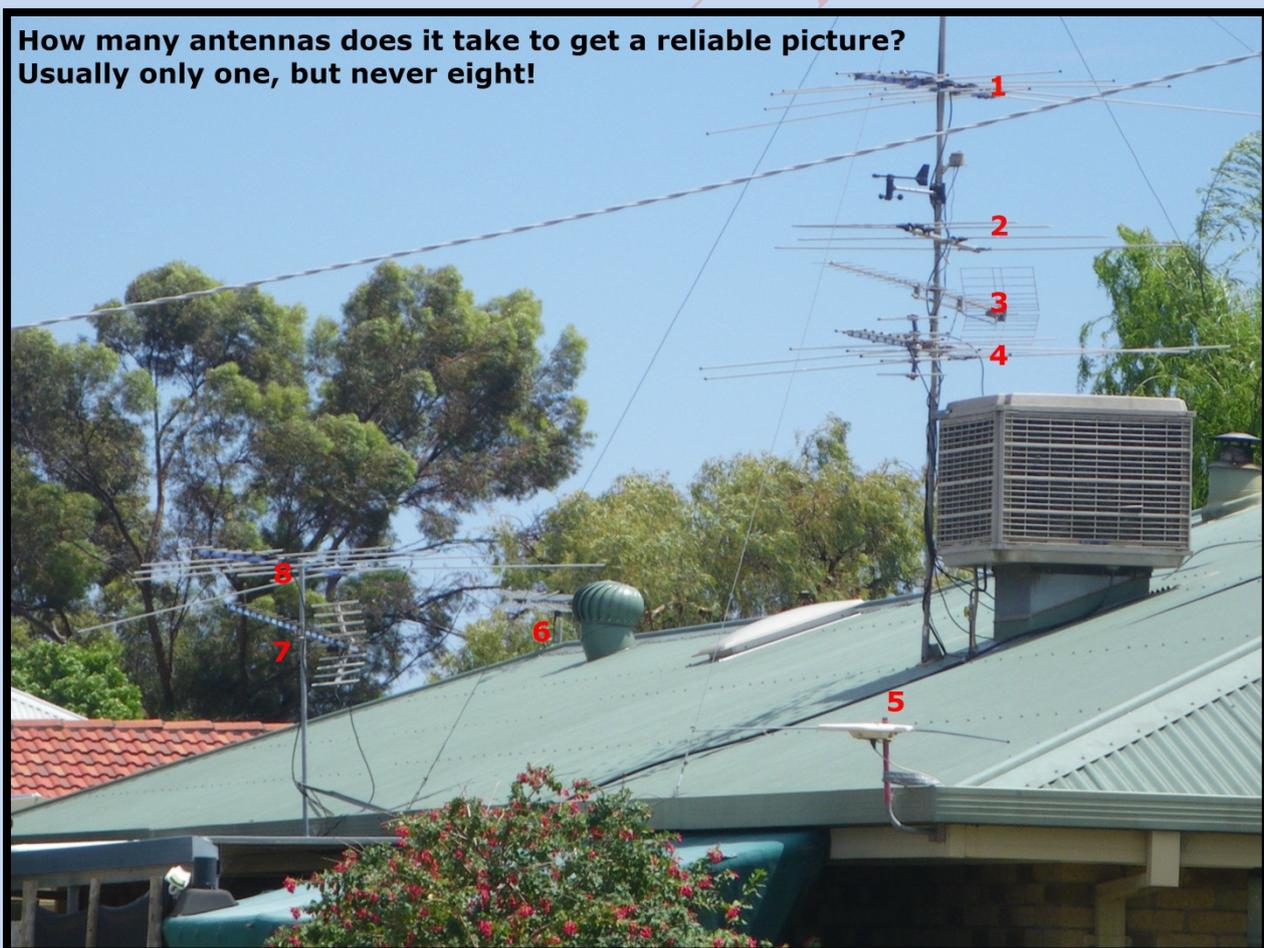
 At the time of writing (Nov2012) there are changes to network channel allocations planned for Australia. This may impact on new antenna selection depending on where you live. Again, if your antenna is currently receiving all digital channels reliably, there should be no need to upgrade it.



7. Poorly selected antenna mounting location.

In an ideal situation, there should be a direct line of sight between the transmitting antenna and your receiving antenna. When this is the case, it is usually not difficult to obtain reliable TV reception. In the real world this is often not the case. This 'line-of-sight' is often obscured by trees, terrain or other buildings. This is where selecting the optimum location on your roof to mount the antenna becomes important. Quite often moving an antenna just a meter or two can make significant difference to the signal strength and quality you receive. In this situation, a professional antenna installer will use a digital TV field strength meter and a hand held antenna to locate the best position on your roof to mount the antenna.

There are other considerations when selecting a position for the mast. It should be installed where it does not lessen the 'street appeal' of the house, and also remain securely fixed to the roof so it doesn't fall over in the next storm.



This picture illustrates the difference between amateur & professional very well.

Synopsis.

TV antenna signal voltages are extremely weak.

A good TV signal measured at the antenna is in the range of 1 to 10 millivolts.

A signal this weak can be very easily be obliterated by poor quality or faulty cable; faulty connections; inappropriate splitters and amplifiers or obsolete analogue components.

 For maximum reliability, TV antenna systems should be designed and installed in accordance with Australian standard. AS/NZS 1367:2007. This specifies the minimum standard required for both safety and reliability.

Quite often, just having all new components is not enough to guarantee reliable TV reception. The components have to be appropriate for the application and correctly installed. This is where the knowledge and experience of a professional antenna installer is needed. They will have specialised test equipment to assist with fault finding and component selection. They should also have everything needed on hand to resolve your problem without endless trips to the hardware store.

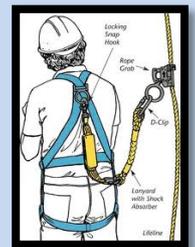


Safety Considerations

 The TV antenna industry in Australia is un-regulated. There are no special licenses required to perform this type of work. Therefore you should be wary of unqualified tradesmen performing this work for you. It also means it is legal for the home owner to do-it-yourself. If you choose to do this you should be aware of the risks.



 **Roof top work is dangerous.** I would advise everyone not to access a rooftop or even climb a ladder without 'working at height' safety training and an appropriate fall restraint harness with a securely mounted safety line.



 **Ceiling crawl spaces are dangerous.** Ceiling spaces are often cramped, hot, dusty environments. There are trip hazards everywhere. There are respiratory hazards, airborne dust and fiberglass particles are common. Asbestos may also be present. There are electrical, TV, phone and data cables; and water pipes which can be damaged by treading on them. There is a risk of electric shock in homes where electrical cabling is not up to standard. There can be exposed screws, nails and timber which can injure you. And of course you have to be careful where you put your feet to avoid falling through the ceiling.

 **Any cabling work has the potential for electric shock.** TV cables are often adjacent to electrical and phone cables inside wall and ceiling spaces. Fixed phone and electrical cables are a 'no-go-zone' for untrained and unlicensed workers. There are significant fines for unlicensed work on fixed phone and electrical cables. It may be possible for TV antenna cables to become 'live' if adjacent electrical cables are not correctly installed or faulty equipment is connected.

This report details some common problems with digital TV antenna system. It should in no way be interpreted as an endorsement for untrained persons to undertake potentially dangerous work. I would advise anyone experiencing TV antenna system problems to contact an experienced antenna installer to have the problem resolved safely & effectively.